INVITED COMMENTARY

Commentary on "'Real Angiosome' Assessment from Peripheral Tissue Perfusion Using Tissue Oxygen Saturation (StO_2) Foot-mapping in Patients with Critical Limb Ischemia"

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When choosing the target vessel for revascularization of an ischaemic foot, common clinical practice and recent guidelines, for example TASC-II, favour grafting of the "best vessel" that crosses the ankle. Although this strategy will most often offer the best run off for the graft or the endovascular reconstruction, it may not offer the best perfusion of the ischaemic area or the best chance of wound healing or limb salvage. As an example, 15% of heel ulcers do not heal even in the presence of a patent bypass graft to the dorsal pedal artery.[1]

In common with the rest of the body, the foot can be divided into a number of three-dimensional blocks of tissue, each with its own feeding artery and venous drainage, the so-called "angiosomes". Plastic surgeons have identified small calibre vessels ("choke vessels") between the angiosomes. Ligation of a feeding artery to an angiosome induces hyperplasia and dilatation of "choke vessels" from the neighbouring angiosomes to form functional collaterals. In this way, larger reconstruction flaps can be harvested in a later operation. In the ischemic foot, however, "choke vessels" are not recruited in a reproducible manner and the collaterals formed between the angiosomes are not always reliable.[2]

A number of recent retrospective comparisons have documented faster wound healing and better limb preservation after direct revascularization of the relevant angiosome than is the case after indirect revascularization of another angiosome. Particularly in patients with microangiopathy due to diabetes or nephropathy, connections between neighbouring angiosomes of the foot are sparse. Even in the absence of randomized trials, it seems fair to argue that current evidence leans towards the position that, when possible, the angiosome-specific artery should be chosen for revascularization rather than just the "best vessel". This would also bring the practice of peripheral vascular surgery into line with that of other surgical specialities, for example coronary bypass surgery and plastic surgery.

The study by Dr Kagaya and coworkers in the present issue of the *European Journal of Vascular and Endovascular Surgery*[3] highlights the complexity of the matter. A detailed mapping of the perfusion of ischemic limbs and comparison with angiographic findings showed less than perfect correlation between the ischaemic areas and the anatomical angiosomes. The anatomy of the angiosomes was originally described by Taylor and Palmer[4] based on a large number of post-mortem dissections of all-comers to a Melbourne hospital. It is not surprising that patients with critical limb ischaemia have different perfusion patterns. The presence of angiographically visible, relevant collaterals has been shown to improve the likelihood of wound healing to the same level as direct revascularization of the ischemic angiosome.[5]

Although potentially confusing, it is important that the observations by Dr Kagaya and colleagues do not cause us to ignore the knowledge provided by the angiosome model and to degenerate into blindly choosing the "best vessel" and to hope for the best for the blood supply beyond ankle level. Rather, we should be prompted to carefully image the circulation of each foot and to base our revascularization strategy on knowledge of the internal circulation within the foot, including angiographically visible collaterals that can be expected to connect the potentially revascularized angiosome with the ischemic area.

Descriptive, detailed perfusion studies, like the present study by Dr Kagaya and colleagues, are of great value for increasing our knowledge about the internal vasculature of the foot and they should be extended to investigate the effects of revascularization.

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DOI of original article: http://dx.doi.org/10.1016/j.ejvs.2013.11.011

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